Installation of a New Emittance Scanner at the AECR-U Beam Transport Line

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A new emittance scanner device (Fig.1) has been installed in order to investigate the ion-optical parameters of the AECR-U injection beam line into the 88-Inch Cyclotron at higher beam-current densities.

Fig. 1. The new emittance scanner head plus vacuum spool and feedthroughs.

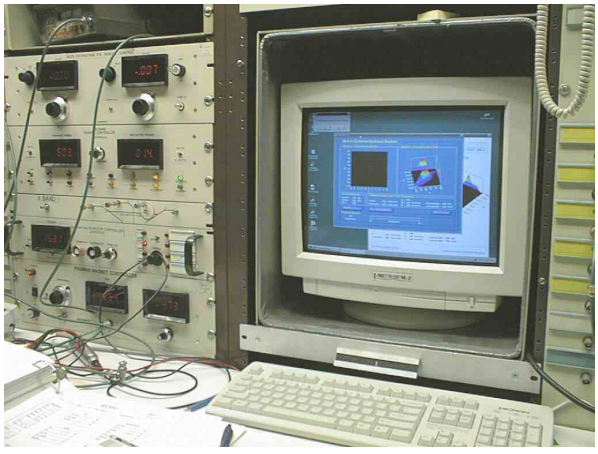

Fig. 2. The scanner computer control at the ion source control console.

An electrostatic-deflection-type emittance scanner has been chosen to allow fast on-line measurements while tuning the ion beam through the cyclotron, because it allows very fast data-sampling. One scan takes between one and two minutes, depending on scan resolution.

A user-friendly computer control (Fig.2 and Fig.3), developed at the 88-Inch Cyclotron, processes the acquired measurement data. The scanner electronics was fabricated at our electronics shop.

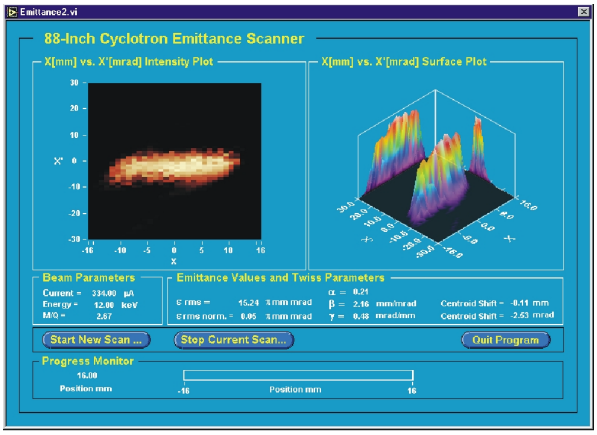

Fig. 3. Software user interface to control scanner settings.

The mechanical design of the scanner head was developed in cooperation with the Ion Beam Technology Program in the Accelerator and Fusion Research Division at Lawrence Berkeley National Laboratory.

The scanner is positioned after the AECR-U mass separator and its coupled diagnostic spool, which contains the mass-resolving slits. For that purpose, a small bending magnet had to be removed from the beam line and replaced with the new spool for the emittance scanner device.

The scanner system is now used on a regular basis for tune-ups of the injection beam line at the 88-Inch Cyclotron.